because he overlooks one of the factors essential to its solution. The cradle of the Maya race is not Yucatan, which they appear to have been the first to occupy as an already civilised people (Mercer). They brought their civilisation with them from the Anahuac tableland, which they had reached from the Atlantic slopes (Tamaulipas, Vera Cruz), where the original stock still survives. Here the widely-diffused Huaxtec nation speaks, not a dialect or a later form, but an archaic type of Maya speech. Here also they had attained a high degree of culture in remote times, as attested by the wonderful truncated pyramid of Papantla, which, although described by Humboldt, appears to be again forgotten. Though of small size, Papantla must rank as the most wonderful structure of the kind in the New World, being built, not of adobe, like Teotihuacan, Cholula, and those farther south, but of huge porphyry blocks covered with glyphs and carvings of snakes and alligators, and exquisitely polished, like the monoliths of Tiahuanaco on the shores of Lake Titicaca. The pyramid is disposed in receding terraces, and the platform on which the sacrifices were offered is approached by a broad flight of steps. Papantla is consequently a type of these structures, which, like the dolmens and menhirs of the Afro-European men of the New Stone Age, may now be followed along the Maya line of migrations through Cholula to Tula (Tollan), and thence by the western (Pacific) route to their new homes in Central America. What drove them south? Natural expansion or invasion? Clearly the latter, else they must have held their ground in the great centres of their culture on the plateau—Teotihuacan and Tula—where the ruins are not of Nahua, but of Maya type. The Nahuas, probably distant kinsmen of the North American Shoshones, came later, and swept in successive waves of barbarism over the tableland, clearing out the cultured Huaxtecs (northern Mayas), and destroying their great city of Tollan, whence came their name, "Toltecs." The last wave was that of the Aztecs, who, after settling in the Valley of Mexico (Tenochtitlan) and developing a certain culture under Huaxtec influences, also spread southwards, following the same Pacific route, and ranging as far as Guatemala, Salvador and Nicaragua (Pipils and Niquirans). Now everything may be explained. Safely entrenched on the Chiapas-Guatemalan plateau, the early Mayas continued to develop their "Toltec" culture, partly assimilating the Quichés and other rude aborigines, all of whom now speak languages of Maya stock, and at last passing at the apogee of their civilisation into the hitherto unoccupied limestone peninsula of Mayapan (Yucatan). Here they were still later (not long before the discovery) followed by the conquering Aztecs, whence the traces of distinctive Nahua art, such as

"those curious mural paintings recently found by Dr. Gann in British Honduras, on the eastern limit of the Maya area, paintings essentially Nahua in style, yet accompanied by a legend in Maya hieroglyphs" (p. 252).

Mr. Maudslay also devotes a chapter to this Maya script, which he rightly distinguishes from the Aztec, while "doubtful if more than a mere trace of phoneticism has as yet been established" (p. 254). A very full and lucid account is given of the ingenious method by which Mr. J. T. Goodman has with some measure of success attempted to solve the riddle of the Maya Calendric system. But, strange to say, no reference is made to Mr. Cyrus Thomas's more extended and perhaps more fruitful labours in this difficult field of palæographic research. In his "Day Symbols of the Maya Year" (*16th Ann. Report Bureau Eth.*, p. 205), Mr. Thomas seems at all events to prove that the Maya Script had passed from the pictographic through the ideographic to an initial stage of a true phonetic system. As in the Egyptian hieroglyphs, all the processes are no doubt intermingled, while several of the symbols must be read phonetically as syllables if not as letters. The system would thus appear to have reached the rebus stage, in which some of the characters are to be taken as pictograms, some as ideograms, and some as syllables irrespective of their pictorial value.

On the broader question of the independent evolution of American culture, Mr. Maudslay takes what may now perhaps be called the orthodox view.

"It is, indeed, possible that accidental drifts from Asia may occasionally have influenced American culture, but such drifts across a great ocean must have been few and far between. If the population of America came originally from the Asiatic Continent, such an original migration must have taken place so early in the history of the human race that it antedated the use of bronze, iron, or domestic animals in the land from which the migrants came" (p. 272).

In other words, whatever the American aborigines owe to the Old World dates from the Stone Ages, as the expression is commonly understood, all else has been locally developed independently of any extraneous influences.

The volume, it is almost needless to say, is superbly illustrated with over a hundred photogravures, chromo-lithographs, ground-plans and etchings, besides a large scale-map of all the Central American lands (Guatemala, Yucatan, Chiapas, Honduras and neighbouring districts) in which ruined cities have been discovered. There is also a sufficiently copious index, and the volume is altogether handsomely equipped. A. H. KEANE.

OUR BOOK SHELF.

Das Geschlecht der Pflanzen. Von R. J. Camerarius. Pp. xiii + 78. (Leipzig: Engelmann, 1899).

IT seems difficult to believe that scarcely two centuries have elapsed since botanists first began to recognise the most elementary fact in the sexual propagation of plants, namely, the function of the pollen as the male fertilising agent. Yet such is the fact. The letter of Camerarius to Valentin, "De sexu plantarum," published in 1694, marks an epoch in the history of botany. Up to that time a knowledge of the processes which must precede the production of a fertile seed had remained *in statu quo ante* since the time of Theophrastus, the pupil of Aristotle; nor was any further substantial advance made before the writings of Kölreuter and Sprengel, seventy and one hundred years later.

The services of Camerarius to botanical science have been amply acknowledged by the historians of botany, especially by Sachs in his "Geschichte der Botanik" (see Garnsey's translation, pp. 385-90), who speaks of his letter to Valentin as being "often mentioned, but apparently little read"; but now for the first time we have a translation of it in any modern language, and the little book is a valuable addition to the botanist's library.

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Camerarius' method was thoroughly Darwinian. His conclusions were based entirely on most careful personal observations; and all objections to his explanations were impartially noted and carefully considered. It was largely from the phenomena exhibited by unisexual, and especially by dioecious, plants that Camerarius drew the conclusion admirably summed up in his own words (Garnsey's translation): "In the vegetable kingdom no production of seeds . . . takes place unless the anthers have prepared beforehand the young plant contained in the seed. It appears, therefore, justifiable to give these 'apices' a nobler name, and to ascribe to them the significance of male sexual organs, since they are the receptacles in which the seed itself, that is, the powder which is the most subtle part of the plant, is secreted and collected, to be afterwards supplied from them. It is equally evident that the ovary with its style represents the female sexual organ of the plant."

The thanks of all botanists are due to the publishers and to Prof. Möbius, who has prepared the translation, for this somewhat tardy tribute to the work of a great investigator. But few of his contemporaries recognised its merits; our own fellow-countryman, Ray, perhaps, more than any other. A. W. B.

Journals and Papers of Chauncy Maples, D.D., F.R.G.S., late Bishop of Likoma, Lake Nyasa. Edited by Ellen Maples. Pp. 278. (London: Longmans and Co., 1899.)

THE presence of an attractive and educated personality for some twenty years in equatorial savage Africa is explained by the fact that Chauncy Maples was an Oxford member of the Universities' Mission to Central Africa. The first sixty pages contain the journal of his journey through the Meto country, an abstract of which was given before the Royal Geographical Society in 1882. The last paper is the unfinished one of a series in the *Nyasa News*, the first paper printed on the lake, and started by him in 1893. It ends with pathetic abruptness by an unanswered question: he was drowned in the lake as he was writing it. The papers form a sequel to the "Life," which has already been noticed in NATURE; they manifest a sincere, human and kindly perception of the aims of scientific investigation. There is much chatty natural history throughout these papers. One of them compares Anyanja with Melanesian as depicted in Dr. Codrington's "Studies." But perhaps the most valuable contribution is the paper read in 1891 before the Oxford Graduates' Missionary Association on the power of the conscience, the sense of the moral law, and the idea of God amongst certain tribes in East Africa. Anthropologists will, in fact, find the first-hand impressions of a cultured English gentleman after years of residence. J. F. H.

Leçons de Chimie Physique. Par J. H. van't Hoff. Ouvrage traduit de l'allemand par M. Corvisy. Deuxième partie: La Statique Chimique. Pp. 162. (Paris: Hermann, 1899.)

WE have now before us a French translation of the second part of van't Hoff's admirable lectures on physical and theoretical chemistry. Attention was drawn in the notice of the first part (NATURE, vol. lix. p. 458, 1899) to the somewhat unusual division of the subject. There, under the title of chemical dynamics, equilibrium and velocity of reaction were dealt with on the basis of thermodynamics and the law of mass action; here, under the title of chemical statics, we have a methodical and systematic treatment of molecular chemistry. In Part I. mathematical methods were of necessity adopted; in Part II. the methods are more purely chemical, and will appeal in especial to the organic chemist.

After a short review of the nature of the atomic and molecular theories, the author proceeds to discuss molecular weight and polymerism in a section which occupies half the present volume. Avogadro's law and the molecular weights of gases naturally receive first attention, and are briefly disposed of. Then, at much greater length, come the methods for the determination of molecular weights in solution, the classification being in accordance with the thermodynamic cycles involved in their deduction from the gas-laws for dilute solutions. Molecular complexity and the anomalies encountered with isomorphous mixtures and electrolytic solutions are next discussed, the section concluding with an account of the work done on solid solutions. The author clearly discriminates between crystalline and amorphous solutions, and it is interesting in this connection to find that he is of opinion that palladium-hydrogen probably contains the hydrogen in the state of single atoms, and that the retention of dyes by fibres is not, strictly speaking, a case of solid solution, but of surface action, like the absorption of various substances by charcoal.

The second section of the book is on molecular structure, and includes subjects of such general chemical interest as the determination of constitution and configuration, isomerism, tautomerism and racemism. As one might expect from the chief founder of stereochemistry, the treatment of this section is masterly, both in its brevity and in its clearness.

The third and concluding section deals with molecular grouping and polymorphism. In it are discussed the laws regulating the transformation of polymorphous substances, the theories of crystallographic structure, and the orientation of molecules in the crystal.

To those who teach and to those who study advanced chemistry the book is indispensable. J. W.

Gli Agrumi. By Prof. Antonio Aloi. Pp. xi + 238. (Milano: Ulrico Hoepli, 1900.)

THIS book, which is one of a series of manuals, deals with the cultivation of oranges, lemons, and other species of the genus *Citrus*.

Among the subjects treated of are the soil and climate suitable to the growth of these plants, manuring, grafting, spacing of the trees, pruning, irrigation, parasites, and maladies. One may mention as deserving special notice the tables given to elucidate the scientific treatment of manuring, which are calculated from chemical analyses of fruit, leaves, &c., combined with the computed production of the latter per plant. With regard to maladies, different remedies, which have been suggested and tried, are described. The concluding chapter contains calculations as to the expenses and profits connected with the cultivation of the plants in question. The book is small, nicely got-up, and contains five coloured plates illustrating different diseases, and twenty-two wood-cuts. It should be very useful to those concerned in the cultivation of oranges and other plants; many points in it, moreover, are of interest to the general botanist.

Star-Land. By Sir Robert S. Ball, F.R.S. New and revised edition. Pp. viii + 388. (London: Cassell and Co., Ltd., 1899.)

THE new edition of this popular work on astronomy, based on lectures addressed to a juvenile audience, calls for little remark. A few additional illustrations have been introduced, but we are astonished to find that some of the original diagrams have not been amended. Fig. 17, for example, shows a large sun-spot far outside the sun-spot zone; and Fig. 23 shows the altitude of the sun at noon on the shortest day much too great in comparison with the position indicated for the longest day. If the author's name were unknown, diagrams like these would certainly suggest a want of personal acquaintance with astronomical phenomena.

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